

Lights



By Tricia Bisoux



Technicians in the audio-visual command center at the new Charles F. Knight Executive Center at Washington University in St. Louis monitor and control audio and video in each classroom simultaneously.

Advancements in **multimedia technologies** and an emphasis on audiovisual prowess are turning business school classrooms into true theaters of educational presentation.

In the “command center” of the 135,000-square-foot Charles F. Knight Executive Education Center at Washington University in St. Louis, Missouri, a row of televisions is positioned above a large console of switches, gauges, and computer monitors. Technicians sit beneath the array of equipment, monitoring the activity in each classroom, from a professor’s movement in the classroom, to the quality of the audio and lighting, to the status of each piece of equipment.

This bustling room—known at the Knight Center as “mission control”—looks more television production studio than computer lab, more Hollywood than higher education. Anyone who enters is almost sure to think the same thing: This isn’t the typical IT support for a business school.

With its growing reliance on distance learning, videoconferencing, and multimedia presentations, business is embracing the latest in audiovisual technologies, perhaps more than any other discipline. And now that most higher education institutions have adopted the latest computer and Internet technology, presentation technologies represent the next frontier for business schools to explore.

“In the past, IT support and AV support were two different functions. Now, the technology has really come full circle. IT and AV have become so interconnected, they’re almost the same,” says Russell Just, an AV technician and head of the audiovisual command center at Washington University.

Equipped with everything from document cameras to data projectors, CDs to DVDs, the classroom, in many cases, has become both stage and recording studio, as educators deliver more sophisticated multimedia presentations to more media-savvy students. As a result, the staging, production, and format of educational materials promise to become almost as important as the materials themselves.

Learning!

“AV cannot be an afterthought. Multimedia is an integral part of the instructional environment, like the markerboard.” —Gerry Ewing, Stetson University

Not an Afterthought

Audiovisual technicians emphasize that educators should think of AV first, not last, when planning a major redesign or new construction. James Westbrook of A Visual Image in Irving, Texas, served as the consultant for the installation of state-of-the-art AV equipment in 150 classrooms at Texas Christian University in Fort Worth, including 30 rooms at TCU’s Neeley School of Business. Westbrook notes that when schools hire an AV technician-consultant too late in the game, they often end up spending more money than they originally planned.

“AV has traditionally been an oversight in both higher education and commercial business. If AV isn’t taken into account from the beginning, electricians may have to rezone lights in the classroom or redo conduits after the fact,” says Westbrook. “A business school can save time and money in the long run by hiring an experienced AV systems integrator as a design consultant in the initial planning stages. A systems

integrator works directly with the architect to coordinate the electrical system and structural requirements in the design.”

The Olin School of Business at Washington University knows this all too well. Although it eventually turned to an audiovisual consultant for help, it did so *after* the Knight Center had already been constructed, which caused difficulties. Most prominently, says Brian Bannister, associate dean of finance and administration, the initial design did not include enough space to accommodate the vast range of audiovisual equipment needed or the office space required for the staff who would oversee its operation.

“The room where the command center is now was supposed to be a storage room,” says Bannister. “When the audiovisual consultant came, he told us he needed a place for ‘the rack.’ We mistakenly thought the AV rack could be placed in a closet. We were totally taken by surprise when we saw how much equipment was involved.” Not only did the Knight Center lose its storage room, but closets throughout

The Metrics of Audiovisual Technology

Information addressed to the design of the 21st-century classroom is still a bit scattered, says Gerry Ewing, director of instructional services at Stetson University. Therefore, he compiled a 21-page list of criteria for design of the modern multimedia classroom. The list represents an assemblage of pertinent information culled from other schools’ past experiences, data from classroom consultants, and presentations at venues such as InfoComm. The following guidelines are adapted from Ewing’s document titled “Classroom Technology: Design Criteria and Considerations”:

Screens

- Many sources that Ewing found recommend that screen height should be one-sixth or one-seventh the distance to the room’s back row. But those same documents recommend that the information on the screen be no more than six words across and six rows down. “When was the last time you saw a professor do that?” he asks. Ewing recommends that screens should be at least one-fifth as high as the distance from the screen to the last row of seats. A rule of thumb is that no one should be closer than two times the image height or farther than six times the height of the screen.
- A screen should be mounted high enough for students in the back row to see its bottom, typically four feet from the floor.

- Screens today are slightly rectangular, in a ratio of 3.0 (height) to 4.0 (width). Because of the use of DVD and HDTV, however, screens that are 30 percent wider will be necessary in the future.

- Ideally, the vertical viewing angle should be about 90 degrees. To assure that those seated at the front sides of any room can properly see the projected image, the maximum horizontal viewing angle should not exceed 110 degrees.

Video/Data Projectors

- Multimedia projectors are permanently mounted to the ceiling. Calculate 2.2 times the width of the screen to approximate the distance between the screen and the lens of the video projector.

Sound

- Major sound system components should include a mixer, loudspeakers, amplifiers and processing, and microphones. The system should be designed for continuous operation and include feedback suppression, not just for speakers at the podium but also for presenters who roam the auditorium using wireless microphones.
- Facilities seating 150 people or more should include a monaural single-source sound reinforcement system to be used to reproduce speech and general background audio from auxiliary sources such as multimedia computers, CD players, or televisions.
- For U.S. schools, the Americans with Disabilities Act requires assistive listening devices for at least 4 percent of the seats, with a minimum of two seats equipped. These requirements may differ from country to country.

Podiums now have become pieces of technological equipment in and of themselves. For instance, the **Symphodium L-150** ▶ from Smart Technologies allows users to control applications, annotate over those applications, and deliver multimedia presentations. The **Wharton Lectern** ▼—co-developed by instructors at The Wharton School and KI, a furniture manufacturer in Green Bay, Wisconsin—is height-adjustable. The podium incorporates touchscreen controls, power outlets, adjustable note-light and microphone, keyboard tray, mousepad, laptop storage, a repository for power and data cables, and even swing-out drink caddies.



the building were repurposed to accommodate audiovisual racks for individual classrooms.

Gerry Ewing, director of instructional and media services at Stetson University in DeLand, Florida, agrees that planning for AV at the outset is crucial to any classroom design. Stetson recently completed renovations of its Lynn Business Center, which included the input of an audiovisual consultant and systems integration company. In addition, Ewing developed exacting specifications and guidelines for incorporating AV equipment into each classroom, combining his past experience in adapting AV technology to the classroom with a wealth of current research.

AV, like any technology, Ewing believes, “cannot be an afterthought. Multimedia is an integral part of the instructional environment, like the markerboard.”

Now that AV has become more integrated with computer technology, the field has become quite specialized, says

Lighting

- Low-voltage controlled switch systems provide control of zoned lighting systems, both incandescent and fluorescent fixtures.
- Fluorescent dimming, via electronic dimming ballasts, provides flexible, reliable, and cost-effective control of standard drop-in ceiling fixtures.
- All light switches and controls should be located adjacent to the multimedia console, as well as each doorway. Switches should be designed to include (or to allow the addition of) low-voltage interfacing with an external audiovisual control system.

Control

- Touchpanel technology simplifies the operation of the entire system by offering an intuitive, visually based control panel for the presenter. The touchpanel can allow faculty to create personal light settings or recall preset scenes and greatly reduces the complexity of system control, allowing users to concentrate on their presentations.

Podiums

- Podiums no longer are the focal point of the modern classroom, as professors prefer to interact more directly with students without a barrier between them. Some schools in corporate height-adjustable podiums, and others, like Stetson University, use podiums built at writing, not reading, height. “We wanted to avoid those lecture halls where the person was almost like a preacher standing behind a massive wooden structure,” says Ewing. “We’ve minimized the height of the

podium and put the computer monitors under the surface, under glass. A 39” height has become the standard.”

Walls

- Walls that provide a backdrop behind anyone likely to be on camera should have a neutral color (such as blue or gray) and a smooth, nonglare surface. Wall surfaces will become more important as more video is recorded digitally, because textured surfaces and bright colors require more memory to store and more bandwidth to transmit via the Internet.

Classroom Size

- Rectangular classrooms should be wide and shallow, to allow professors the best access to students. An “ideal room dimension ratio” is 1.0 (height) to 1.5 (width) to 2.5 (length).
- Large classrooms should not include a raised stage, since it does not keep faculty on the same level with students and hampers their movement throughout the classroom.

Infrastructure

- HVAC vents should be located away from ceiling-mounted projection equipment and document cameras. Furthermore, vents should be placed away from projection screens so that air circulation does not move the screen.

For a complete copy of “Classroom Technology: Design Criteria and Considerations,” contact Ewing at gewing@stetson.edu.

Sophisticated computer software and the newest Web-based technology make it possible for a technician to **detect—and fix—a problem** before a professor even knows one exists.

Westbrook. With modern classrooms incorporating smart podiums, DVD/VCRs, digital document cameras—and the lighting, sound systems, wiring, and control systems that come with them—a school's regular IT staff may not be enough.

“AV technology is advancing very rapidly,” Westbrook says. “A traditional consultant may not be able to keep up in the same way as a dedicated AV technician who is in the field installing the equipment every day.”

Organizations such as the International Communications Industries Association (www.icia.org) headquartered in Fairfax, Virginia, and the National Systems Contractors Association (www.nasca.org) in Cedar Rapids, Iowa, offer business schools a place to start when contemplating the AV equipment and support for a new facility or renovation; they offer listings of qualified consultants, as well as information about the latest technology. In addition, the ICIA sponsors InfoComm, an international trade show showcasing the latest in presentation technologies.

To stay up on the latest AV technologies, Washington University's Bannister and Just regularly attend InfoComm to keep up with the technologies available. They emphasize that creating the right balance of audiovisual technologies in the classroom isn't about buying the most expensive products. It's about planning ahead, staying informed, and getting the best products to suit a school's needs.

Hollywood Productions

The comparison between the classroom and a theater is nothing new. But the comparison is now going beyond analogy. Increasingly, a business school classroom is taking on the accoutrements of a professional theater, complete with lights, cameras, microphones, and acoustical panels. Many schools are paying close attention to light, wall color, and sound quality in anticipation of digitally recording classes for replay via DVD and online streaming video.

Classroom lighting has also come to the forefront to add more drama to the classroom. Easy-to-use touchpanel controls allow professors to act as their own lighting directors, choosing the level and areas of lighting most appropriate for a presentation. In addition, professors who once avoided using projectors for fear their students would fall asleep in the darkness now can use them throughout class and still keep their connection with students. Lights in projectors are now bright enough for images to be viewed in only slightly dimmed or even full light.

Lighting, automatic screens, ceiling-mounted projectors, and other media—matched with the power of the Internet—

New data walls, including this one manufactured by **Trans-Lux** ▼, can display anything from stock ticker information to CNN. The data wall shown here is at the University of Saskatchewan in Saskatoon.



Smart Technologies has just introduced its newest SMART Board technology, which incorporates "DVIT" (or digital vision touch). The technology allows for more sophisticated touchscreen controls for computer applications and Web site navigations. Professors can write notes over any application, including video; no special pen is required, because digital cameras in the corners of the screen and software detect any object in view of the screen. The 2000i also can record activity on the screen and the instructor's voice simultaneously for later playback. DVIT is available in the interactive [Rear Projection SMART Board 2000i](#) and [SMART Board for Plasma Displays](#).

have given educators new freedom to be creative in the classroom, says Larry Kitchens, director of instructional services at Texas Christian University. Professors can create an entire multimedia presentation at home, post it to the Web, and download it to the classroom computer. There is no need to photocopy handouts, hook up laptops, or even order that soon-to-be-obsolete AV-cart-on-wheels.

"There was a time when we didn't have enough projectors to circulate among classrooms," says Kitchens. "Now, we have projectors, screens, VCRs, DVDs, and CD players in each classroom. Professors have really changed the way they design their presentations, to include PowerPoint, commercial CDs, and videotapes."

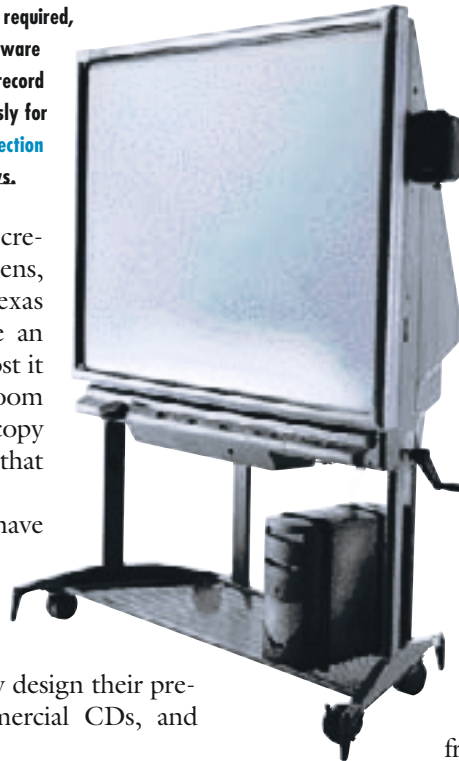
Although some educators were reluctant to integrate technology into their course delivery just a decade ago, now they are the primary drivers for change in the market for presentation technologies, says Nancy Knowlton, president and co-CEO of Smart Technologies, a manufacturer of interactive SMART boards in Calgary, Alberta. "Educators have asked us to make the workspace as flexible as possible, yet still easy to use," says Knowlton. "They don't want to use just one Web site or one CD-ROM or one software application. They want to combine them all."

With more access to presentation technologies, business students are using the equipment as much as the business faculty, creating everything from PowerPoint presentations to full-fledged commercials. The shift from teacher-generated materials to student-generated materials is an exciting side effect of having the equipment so readily available.

"We frequently check out camcorders and digital cameras to students. We've helped students edit video for marketing and advertising classes. Some students have done fictitious ads for beauty products and motorcycles, using their roommates as actors," says Ewing of Stetson University. "Some of the ads are better than what I see on television."

From Mission Control to e-Control

A primary driver in the increasing popularity of AV equipment in the classroom has been advancements in AV controls. For instance, wireless remotes and laser pointers now allow professors to change PowerPoint slides, start a DVD, change a television channel, or point out specific data from anywhere in the room, so they never have to turn their backs to the audience. Likewise, sophisticated computer software and the



newest Web-based technology make it possible for a technician to detect—and fix—a problem before a professor even knows one exists.

Jason Frenchman of Crestron, a manufacturer of audiovisual control systems headquartered in Rockleigh, New Jersey, says that level of control has been very attractive to the budget-conscious higher education market. For instance, its touchscreen product Media Manager offers centralized control of everything from the lights to the document cameras to the PowerPoint presentation on a PC. It allows control not only within the classroom, but also from remote locations.

"There has been a convergence of audiovisual technologies with computer presentation technologies. In addition, distance learning has become a huge phenomenon. Therefore, the ability to control audiovisual equipment and presentation technology remotely has become more important," says Frenchman. "With today's technology, a school's director of instructional services can know that a lamp in a particular classroom is going to go out tomorrow and that he needs to replace it, which can make his life easier."

That kind of technology is called "e-control," referring to the Web-based management and diagnosis of equipment and technology in the classroom. Only a few higher education institutions are using e-control to its fullest extent, says Ewing. The functionality it adds to the classroom, however, makes it likely to become a standard feature on most campuses.

"The technology is now at the point where every classroom can have its own IP address," says Ewing. "I can pull up a duplicate of the touchscreen that operates a classroom several buildings away. I can see what options the professor has chosen. I can turn the lights on or off, log lamp life, or see that someone's in a room who's not supposed to be and notify campus security." As a result, tasks that once took a collective of staff members can now be conducted by only one person.

AMX Corporation of Richardson, Texas, is another company in the control systems market. AMX has recently introduced products tailored to the education market. Its 17-inch Modero display offers more space for the increasing number of touchscreen buttons required by a multimedia classroom. Another product, Meeting Manager, allows instructors to preprogram integrated presentations before class even

Not only can educators control all classroom equipment via a podium with touchpanel technology, but technicians can access that same equipment off-site via the Internet. AMX's 17" Modero touchpanel and Crestron's e-control interface are two products available for internal and external room controls.



place,” says Coyne. “That reaction can be a big recruitment tool.”

Bannister of the Olin School agrees that the “wow” factor can be a way to enhance a school’s public persona. In fact, he believes the Olin School may have missed an opportunity to take full advantage of its IT and audiovisual command center, now located in the back of the Knight Center behind closed doors. Had Olin School administrators known then what they know now, says Bannister, they might have chosen to place the command center in a more prominent place in the building, behind glass, so that visitors could easily pause for a moment to view it in action.

begins, explains Scott Norder, AMX’s vice president of business development.

“If an instructor wants to present pre-recorded content, he can schedule a classroom to have the VCR cued to display the show and the TV monitors and projectors in the room tuned to the right channels,” Norder explains. “Such control systems make the more complex presentation systems effortless to operate and easy to maintain. Rather than worry about the equipment, instructors can focus on what they do best—educating.”

The “Wow” Factor

Enhancing the functionality of classroom AV equipment is only one reason b-schools are tapping into this new technology. They’re also using the visual impact of audiovisual technology to enhance their campuses. Colorful data walls that display a range of stock information and video in real-time have offered business schools a way to send a message to the public that they stand at the forefront of the information age.

Gene Coyne is vice president of sales for Trans-Lux of Norwalk, Connecticut, a provider of electronic display walls. In the past, he says, Trans-Lux primarily served the corporate and investment market, but business schools are becoming a growing presence on his client list. One reason for this burgeoning interest in real-time displays, he believes, is business schools’ pursuit of that ever-elusive “wow” effect.

“When students and potential donors tour a school, the school wants them to walk in and say, ‘Wow, look at this

New Challenges

Educators know that students are bound to become more accustomed to the “wow” of multimedia and may be less than satisfied with the static presentations of the past. The implications for educators may be significant. Schools may put more into producing their course videos, to create more sophisticated videos for students who watch the recording outside the classroom. They may move more courses to be broadcast via streaming video, or require that courses be recorded in multiple formats for flexible access. They may become, in essence, more like Hollywood than ever before.

Bannister of the Olin School points out that its executive MBA and executive education students are developing higher expectations when it comes to the quality and aesthetics of taped classes. The format of recorded classes is also becoming an issue. Some students prefer to watch the recordings on the road, but they are unable to watch VHS tapes when they travel. Likewise, streaming video requires a high-speed Internet connection that not all hotels provide. Consequently, students are requesting that courses be recorded straight to DVDs, which can be viewed on a laptop anywhere in the world.

“Production issues have become a greater challenge,” says Just. “If we don’t go straight to DVD, it’s a huge process to transfer a digital signal to DVD. And if you have 13 hours of courses to transfer at the end of a weekend—and everyone wants their media by Tuesday—your time is limited.”

On a recent trip to InfoComm, Just saw a new generation

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of recording technology that intrigued him. “We found a \$5,000 classroom device that will take video straight to DVD,” says Just, “and think that going straight to DVD is what we need to do for this audience.”

The Next Wave


Courses for some disciplines, such as literature or mathematics, may never become multimedia havens. The subject matter does not require such an approach. But in disciplines such as the sciences, the performing arts, and business, audiovisual technologies will make more possible in the classroom than ever before.

“Students want to be engaged in the classroom just as they’re now engaged in their ordinary lives,” says Knowlton of Smart Technologies. “Multimedia is everywhere, so if all an instructor does is talk, that isn’t going to make an impression on many of today’s students.”

Bannister and Just of the Olin School already are looking at the next progressions in technology, including an audience response system that will allow students to respond to classroom questions electronically. They’re even considering adding motion-activated cameras to classrooms. “That camera technology will enable us to have a ‘follow-the-professor’ automatic camera system that will be motion-oriented. It can

focus on the professor and track his or her movements. Eventually, that will keep us from needing a dedicated technician,” says Bannister.

Ewing of Stetson University, for one, is excited about the future of classroom AV technologies. He looks forward to the advancement of streaming video and high-definition television, or HDTV, to enhance the classroom experience even further. “For a long time, I worked mainly as an AV technician, but now I think I’m back to the job I always wanted to do, which is instructional design and development,” Ewing says. “At this stage, the technology is fairly robust and almost bulletproof. We have touchscreen panels and Web-based controls, so we don’t have to run to the next building to fix a problem, and we don’t have to train users as much. We can get on with the business of teaching.”

As Ewing has found, audiovisual technology is changing the way educators present information in their classes just as profoundly as computer technology changed what information they presented. The better the lighting, the more inviting the sound, and the more exciting the presentation, some believe, the more interactive and effective the class. The danger, of course, is that once students have a taste of classes that take advantage of the full range of multimedia options, there’s no going back to the chalkboard again. 



The popularity of distance learning has been an important driver in the increase in the implementation of AV-infused classrooms. Stetson University, for example, incorporated three distance learning rooms in the renovation of its business school building.